

11/9/17

"If you love what you have, then you have what you need."-Lisa Lopicollo

HW: Complex Fractions worksheet #3, 4, 5, 6, 10, 11

AIM: How do we Simplify Complex Fractions?

Warm Up:

Perform the indicated operation and simplify (Dont forget to indicate restrictions)

$$1. \frac{a}{a+2} - \frac{2}{3-a} - \frac{3a+1}{a^2-a-6}$$

$$2. \frac{x^2-9}{27+3x^2} \cdot \left(\frac{x^2+x-6}{x-4} \div \frac{6-x-x^2}{3x-12} \right)$$

$$\frac{a(a-3)}{(a+2)(a-3)} + \frac{2(a+2)}{(a+2)(a-3)} - \frac{3a+1}{(a+2)(a-3)}$$

$$\frac{(x-3)(x+3)}{3(9+x^2)} \cdot \left(\frac{(x+3)(x-2)}{x-4} \div \frac{-1(x^2+x-6)}{3(x-4)} \right)$$

$$\frac{a^2-3a+2a+4-3a-1}{(a+2)(a-3)}$$

$$\frac{(x-3)(x+3)}{3(9+x^2)} \cdot \frac{(x+3)(x-2)}{x-4} \cdot \frac{3(x-4)}{-1(x+3)(x-2)}$$

$$\frac{a^2-4a+3}{(a+2)(a-3)}$$

$$\frac{(x-3)(x+3)}{-1(9+x^2)}$$

$$\frac{(a-1)(a-3)}{(a+2)(a-3)}$$

$$\frac{x^2-9}{-x^2-9} \quad x \neq 4, -3, 2$$

$$\frac{(a-1)}{(a+2)} \quad a \neq -2, 3$$

A fraction in which the numerator or denominator contains one or more fractions or negative exponents is called a *complex fraction*.

1. Simplify $\frac{\frac{3}{2} + \frac{3}{x}}{2 + \frac{4}{x}}$

Method 1

Steps

1. Combine fractions in numerator
2. Combine fractions in denominator
3. Rewrite as a division problem
4. Follow rules for division

Method 2

Steps

1. Find LCD of all “little” fractions
2. Multiply entire fraction by LCD of all denominators
3. Simplify

STEPS For Simplifying Complex Fractions:

- 1) Make the numerator a single fraction.
- 2) Make the denominator a single fraction.
- 3) Turn it into a multiplication by the reciprocal of the denominator
- 4) Simplify

1) $\frac{\frac{3}{x^2} + \frac{3(2)}{x(2)}}{\frac{2}{x} + \frac{4}{x}}$ $\xrightarrow{\text{LCD: } 2x}$ $\frac{\frac{3x}{2x} + \frac{6}{2x}}{\frac{2x}{1x} + \frac{4}{1x}} \Rightarrow \frac{3x+6}{2x} \div \frac{2x+4}{x}$

Step 3) $\frac{3(x+2)}{2x} \cdot \frac{x}{2(x+2)} = \frac{3}{4}$

Simplify each of the following.

2.

$$\begin{array}{l} \text{LCD: } 3w \\ \frac{\overset{(w)}{7}}{\underset{(w)}{3}} + \frac{\overset{(3)}{1}}{\underset{(3)}{w}} = \frac{7w}{3w} + \frac{3}{3w} = \frac{7w+3}{3w} \\ \frac{\overset{(3)}{2}}{\underset{(3)}{w}} - \frac{\overset{(1)}{1}}{\underset{(w)}{3}} = \frac{6}{3w} - \frac{1w}{3w} = \frac{6-w}{3w} \end{array}$$

Step:
3

$$\frac{7w+3}{\cancel{3w}} \cdot \frac{\cancel{3w}}{6-w} = \frac{7w+3}{6-w}$$

6)

$$\frac{\frac{n}{1} - \frac{1}{n}}{\frac{1-n^2}{n}} \xrightarrow{\text{LCD: } 1n} \frac{\frac{n^2}{1n} - \frac{1}{1n}}{\frac{1-n^2}{n}} \Rightarrow \frac{\frac{n^2-1}{n}}{\frac{1-n^2}{n}} \Rightarrow \frac{1-n^2}{n}$$

Step:
3

$$\frac{\cancel{n^2}^{-1}-1}{\cancel{n}} \cdot \frac{\cancel{n}}{\cancel{1-n^2}} = \boxed{-1}$$

$$\frac{\cancel{(n+1)}\cancel{(n-1)}^{-1}}{\cancel{n}} \cdot \frac{\cancel{n}}{\cancel{(1+n)}\cancel{(1-n)}} = \boxed{-1}$$

7.

$LCD = x$

$$\frac{\cancel{x} \cdot 1 - \frac{1}{\cancel{x}}}{x} \quad \frac{\cancel{x}}{\cancel{x}} - \frac{1}{\cancel{x}} \Rightarrow \frac{\cancel{x} - 1}{\cancel{x}}$$

$$\frac{\cancel{x} \cdot x - 2 + \frac{1}{\cancel{x}}}{1} \quad \frac{x^2 - 2x}{x} + \frac{1}{x} \Rightarrow \frac{x^2 - 2x + 1}{x}$$

Step:
3

$$\frac{\cancel{x} - 1}{\cancel{x}} \cdot \frac{\cancel{x}}{x^2 - 2x + 1} = \frac{1}{x - 1}$$

$(x-1)(x-1)$

8.

$$\frac{\frac{a}{a+b}}{1 - \frac{b}{a+b}}$$

9.

$$\frac{1 + a^{-1}}{a - a^{-1}}$$